Making Smart Technology Smarter

An Interview with
Francisco José Ayala, Ph.D., Founder and Chief Scientist, Neuroblast

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EDITORS' NOTE *Francisco José Ayala holds a B.A. in Biochemistry and a Ph.D. in Organismic and Evolutionary Biology, both from Harvard, and has three years of postdoctoral experience at the Institute of Molecular Evolutionary Genetics. He is the author of 15 publications in topflight scientific journals, including* Genetics, Molecular Biology and Evolution, *and* Cellular and Molecular Life Sciences, *and some of his research programs have garnered international attention in the popular as well as the scientific press, including* Science, Nature, *and several textbooks.*

COMPANY BRIEF *Headquartered in Dallas, Texas, Neuroblast's (www.neuroblast.com) revolutionary algorithm evolution engine creates artificially intelligent algorithms. The company specializes in particularly difficult problems involving complex, nonlinear, multiple-input/output, and multiple-objective processes operating in dynamic, noisy, and unpredictable environments – the kind of problems that overwhelm conventional control algorithms.*

Would you give an overview of Neuroblast?

Neuroblast creates intelligent algorithms – we make smart things smarter.

We have created an algorithm evolution engine that is capable of creating almost any conceivable kind of neural processing system, from systems as simple as old-school artificial neural networks to systems as complex as our cerebral cortex, and far beyond that.

All of this is in the service of making our smart technology even smarter.

How did this all come about? What was the vision behind it?

My background is in evolutionary theory, so I study how complex systems arise from simple components: examples include metabolic pathways, ant colonies, ecosystems, and the human brain.

I had an academic interest in understanding how these tangled masses of billions of neurons in our brain make us intelligent and conscious.

At some point, I realized this could also be a fantastic business – that there was a great need for intelligent devices, for our computers to be smarter.

How vast are the opportunities when you look at the kind of impact this can have?

Neuroblast's neural algorithms have the potential to improve our lives in almost every way imaginable.

They can make our lives safer – think of robots that can do hazardous work, like fight fires. They can make our lives more efficient – think of traffic lights that can optimize traffic flow in real time around accidents and sporting events. They can make technology more accessible – think of expert medical diagnoses in remote African villages that don't have doctors; and imagine in sports, umpires and referees that see everything and never blow a call.

Are there competitors in this space?

There are many people doing many exciting things in AI, but I know of nobody else doing what we do. When I first developed an intense interest in this, I started to look around for other people that I thought were approaching this the way I wanted to, but I couldn't find anyone. That's when I decided to do this myself, and Neuroblast was born.

Our approach is the idea that there is only one known example of a truly intelligent device, and that is the biological brain; and there is only one known design paradigm that has ever created such a device, and that is biological evolution.

So Neuroblast uses a virtual evolutionary world to create intelligent neural algorithms.

Another reason why no one else is doing this is that we now have a large portfolio of patents that protects what we do.

Was there ever a doubt you were going to end up in an entrepreneurial environment?

Transforming myself from an academic scientist into an entrepreneur took a great deal of cognitive restructuring.

In academic science, if it isn't published, then it didn't happen. As an entrepreneur, at first I wanted to publish my secret recipe, but when I showed a paper to the VCs describing some of our methods, they lost it – they said, you can't share any of this.

At what point, do you feel you've accomplished what you set out to do?

Whenever we see our technology becoming smarter, this is an incremental indication of success. But I don't think we'll ever be done, because as far as we know, there is no evolutionary or physical limit to intelligence.

We can imagine neural algorithms that are a billion times more intelligent than Einstein. The potentials are infinite.

Has the speed of technology changed how you're operating?

When we started this project, it would have been inconceivable five years prior to that because we didn't have the computational speed to make this happen.

Now computers are faster and cheaper – this speeds up our work tremendously.

Is this type of research well accepted today in the market?

There are two barriers we need to overcome in that regard. The first is, the early attempts by the artificial intelligence community to create systems modeled after our brain were only very superficially brain-like and not all that capable. As a result of that very first baby step not being tremendously successful, that entire focus of AI turned more towards conventional computer programming and statistics, and expert systems and things like that. The whole field moved away from neural systems.

This seems like a bizarre historical anomaly to me because it seems so self-evident that the only known example of an intelligent system is the biological brain, so it makes sense that if we're going to create intelligent computers, they should be somewhat brain-like as opposed to endless series of computer code or statistical methods.

Another barrier we have to overcome is that we actually often can't explain how our algorithms work. We know they work – we can meet all the specs that people give us. But what we have is this incredible mass of neurons with countless connections among them and our neural algorithms have become so complex that it's almost impossible to know how exactly they're working.

What kind of role can this play in the corporate world?

Neural algorithms will make companies more profitable in any number of ways. Just imagine having robotic workers that don't get tired or sick, or having highly accurate robotic quality control inspectors at all levels of production or highly efficient real-time adaptive scheduling, planning, and routing.

All of these things that human level intelligence can contribute to improving your bottom line, we want to make your computers able to do even better.

Is there resistance to this in terms of the jobs it would replace?

A good analogy to this situation is the Industrial Revolution, which replaced human strength with machines that were stronger and could do far more.

It created opportunities for humanity, including newer and higher quality jobs. ●